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(54) **CLEAT ASSEMBLY FOR CLIPLESS BICYCLE PEDAL**

KLEMMANORDNUNG FÜR KLIKKPEDALE VON FAHRRÄDERN

ENSEMBLE CALE POUR PÉDALE DE VÉLO AUTOMATIQUE

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Description

Field of the Invention

[0001] The present invention relates generally to cleat assemblies configured for releasable securement to pedals for bicycles and the like, and, more particularly, to clipless bicycle cleat assemblies having improved durability, operation, and feel.

Background

[0002] Footwear-mounted engagement methods have been used in cycling, skiing, snowboarding, rowing, and numerous other sports, to attach a user to a device for increased power and/or control.

[0003] Engagement of footwear-mounted cleats or cleat assemblies to bicycle pedals, in particular, have been notoriously difficult for a number of reasons. The cleat is mounted to the underside of a rider's shoe sole and is thus hidden from view. Likewise, the pedal assembly, being mounted to the underside of the rider's shoe sole, is also obscured from view by the shoe during the engagement process. Thus, engagement of a rider's shoe to a pedal assembly requires the rider to blindly align or engage the cleat to the pedal, relying primarily on tactile feedback and most typically while the rider is still in motion.

[0004] The tactile feedback experienced during engagement and disengagement of cleat assemblies to a pedal may change over time and use. Cleat assemblies are typically subjected to significant wear and tear during use and also when the user is simply walking around, as, the bottom most surface of the cleat assembly necessarily makes direct contact with the ground. Moreover, cleat assemblies may include multiple parts, typically made from various different materials having different material properties, which are coupled together. Over time and use, the material properties may change to alter the tactile feedback of the cleat assembly during engagement with and disengagement from the pedal.

[0005] A bicycle cleat assembly according to the preamble of claim 1 is shown in the document US 7 877 904 B2.

Brief Summary

[0006] It is desirable for bicycle cleat assemblies to substantially withstand the physical rigors during use and when the user is simply walking. As cleat assemblies are often constructed of multiple parts comprising various different materials exhibiting different physical characteristics such as strength, stiffness, elasticity, plasticity, ductility, malleability, hardness, brittleness, etc., it is important that the cleat assemblies do not change significantly so as to materially change the tactile feel during engagement with and disengagement from the bicycle pedal.

[0007] For example, it is preferable that the various

parts that comprise a bicycle cleat assembly remain securely coupled to one another, such as by way of bolted joints, in order to reduce or eliminate sloppy feel, particularly while the bicycle cleat assembly is releasably secured to a bicycle pedal and during the pedal engagement and disengagement process. Tightening attachment screws will apply varying degrees of clamping force to any intervening components of the bolted joints of the bicycle cleat assembly. If intervening components in a bolted joint comprise a deformable material (i.e., elastomeric materials, plastic, and other similar types of materials), repeated tightening of the attachment screws may be required because the aforementioned intervening components can deform over time in response to the resulting clamping force. The intermediate plate can also comprise a substantially non-deformable material such as metal alloy or a combination of deformable and non-deformable materials.

[0008] In one embodiment, a cleat assembly configured to be releasably secured to a clipless bicycle pedal according to the features of claim 1 is described.

[0009] Other features and advantages of the present invention should become apparent from the following description of the preferred embodiments, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

Brief Description of the Drawings

[0010]

FIG. 1 is a top plan view of the first plate of an embodiment of the cleat assembly in accordance with the invention.

FIG. 2 is a top plan view of the first plate and the intermediate plate of an embodiment of the cleat assembly in accordance with the invention.

FIG. 3 is a top plan view of the first plate, the intermediate plate, and the second plate of an embodiment of the cleat assembly in accordance with the invention.

FIG. 4A is an exploded side elevational view of the first plate, the intermediate plate, the second plate of an embodiment of a cleat assembly in accordance with the invention.

FIG. 4B is an exploded side elevational view of the three plates of the embodiment of the cleat assembly depicted in FIG. 1, the plates being rotated clockwise 90°.

FIG. 5 is a top plan view of the first plate, the intermediate plate, the second plate, and the elastomeric cap of an embodiment of the cleat assembly in accordance with the invention.

FIG. 6 is a perspective view of the topside of the second plate of an embodiment of the cleat assembly in accordance with the invention.

FIG. 7 is a perspective view of the second plate and the elastomeric cap of an embodiment of the cleat assembly in accordance with the invention.

FIG. 8A is a side elevational view of the first plate of an embodiment of the cleat assembly in accordance with the invention.

FIG. 8B is a close-up cross sectional view of a portion of the second plate and a portion of the intermediate plate of an embodiment of the cleat assembly in accordance with the invention.

FIG. 8C is a side elevational view of the second plate coupled to the first plate of an embodiment of the cleat assembly in accordance with the invention.

FIG. 8D is a perspective view of the underside of the second plate of an embodiment of the cleat assembly in accordance with the invention.

FIG. 9 is perspective view of the underside of the intermediate plate and the second plate of an embodiment of the cleat assembly in accordance with the invention.

FIG. 10 is a top plan view of an embodiment of a clipless bicycle pedal with which the cleat assembly can be used.

Description of the Preferred Embodiments

[0011] With reference now to the illustrative drawings, and particularly to FIGS. 1-3, there is shown an embodiment of a cleat assembly **10** in accordance with the invention, configured for attachment to the sole of a user's shoe (not shown) and for releasable securement to a bicycle pedal **60** (FIG. 10). The particular cleat assembly depicted is configured for attachment to the user's left shoe, but it will be appreciated that a similar cleat assembly could be oppositely configured for attachment to the user's right shoe. The clipless bicycle cleat assembly includes a first plate **12**, an intermediate plate **16**, and a second plate **20**. The first plate is configured to be secured to the shoe's sole (not shown) by screws **14** extending through three elongated openings **15**. In one embodiment, the first and intermediate plates are made of plastic and the second plate is made of a metallic material.

[0012] More particularly, as illustrated in Figures 4A and 4B, the intermediate plate **16** and second plate **20**, together, are configured to be secured to the first plate **12**. A spring clip **18** is mounted between the intermediate plate and the second plate (see also FIGS. 2, 3), for re-

leasably engaging the pedal when the cleat assembly is positioned over the bicycle pedal **60** (FIG. 10). It should be noted that engagement mechanisms other than a spring clip can be used to releasably engage the cleat assembly to the pedal.

[0013] With reference now to FIG. 5, there is shown an embodiment of a clipless bicycle cleat assembly **10** in accordance with the invention, that includes a cap **22**. The cap overlays the second plate **20**. The cap is sized to project slightly above the exposed surface of the second plate, and the exposed edges of the cap are rounded. The second plate thereby is slightly recessed from the cap, such that only the cap engages the ground when the user walks about. Preferably, the cap is formed of a molded elastomeric material such as polyurethane, to provide improved frictional engagement with the ground and thereby to make walking more comfortable for the user. In existing cleat assemblies lacking a cap, when the cleat assembly is disengaged from a pedal and the user is walking about on the ground, the second plate is in direct engagement with the ground requiring the user to use care when walking about. This direct engagement also has led to undesired wear of the second plate. Additionally, in cleat assemblies having a metallic second plate, the user must be careful not to scratch the pedal when engaging the cleat assembly to the pedal. In the current embodiment, the cap addresses these issues. In addition, if the cap becomes unduly worn from substantial walking, it can be readily replaced. The cap's rounded shape also improves the cleat's aerodynamic properties.

[0014] With reference now to FIG. 6, there is shown the second plate **20** of an embodiment of the clipless bicycle cleat assembly **10** in accordance with the invention. The second plate includes a body **22** defining a portion of a first pedal aperture **24**, the first pedal aperture being sized and configured to receive the clipless bicycle pedal **60** (FIG. 10). The second plate also includes a forward flange **26** and rearward flange **28**, top surface **30** (FIG. 8D) and a bottom surface **32**. The forward flange of the second plate includes two spacers **34** each having a central bore **40** that extends through the forward flange. Similarly, the rearward flange of the second plate includes two spacers **36** each having a central bore **40** that extends through the rearward flange. The second plate of the embodiment also includes a side tie **25** defining a portion of the circumference of the first pedal aperture wherein the circumference of the first pedal aperture is fully enclosed. The side tie of the embodiment forms a U-shaped structure wherein the side tie curves away from the plane defined by the second plate's body and in the direction of the first plate (FIG. 7C). The curvature of the side tie is provided to accommodate the shaft **62** of the bicycle pedal **60** (FIG. 10) when the clipless bicycle cleat assembly is releasably secured to the bicycle pedal. The side tie serves to increase the rigidity and strength of the clipless bicycle cleat assembly compared to a cleat assembly having a pedal aperture the circumference of which is only partially enclosed.

[0015] With reference now to FIG. 7, there is shown the second plate **20** of an embodiment of the clipless bicycle cleat assembly **10** in accordance with the invention. The second plate's forward and rearward flanges each also has an outer edge forming a plurality of vertical grooves **38**. A cap **22** can be disposed over at least part of the bottom surface of the second plate. In this embodiment, the cap comprises a molded elastomeric material and has a top surface **40** comprising a plurality of tongues **42** corresponding to the plurality of vertical grooves **38** formed in the forward and rearward flanges of the second plate.

[0016] With reference now to FIGS. 8A-8D, there is shown the second plate **20** of an embodiment of the clipless bicycle cleat assembly **10** in accordance with the invention. The top surface **30** of the forward flange **26** forms two spacers **34**. The top surface of the rearward flange **28** forms two spacers **36**. As noted above, each of the spacers has a central bore **40** extending through the forward and rearward flanges (FIGS. 6A and 6B). Each of the spacers also has a sidewall **44**, a base end **45** and a terminal end **46**. The sidewalls of each of the spacers of this embodiment are tapered from the base end toward the terminal end. The terminal ends of the spacers abut the first plate **12** when the second plate is coupled to the first plate and, therefore, the length of the second plate's spacers define a space between the first plate and the second plate when the clipless bicycle cleat assembly is assembled (FIG. 8C). In the present embodiment, the intermediate plate **16** is made of plastic. The spacers serve to provide a rigid support to avoid deformation (also known as "creep") of the intermediate plate when the attachment screws are tightened. The intermediate plate can also serve as a spring housing. Without the spacers, tightening of screws attaching the first plate to the second plate can deform the intermediate plate and, as a result, restricted free flexing movement of the spring clip **18** that can be contained within the intermediate plate (FIG. 18). Restricting the free flexing movement of the spring clip can make it more difficult to engage or disengage the spring clip to/from the pedal.

[0017] With reference now to FIG. 9, there is shown the second plate **20** and intermediate plate **16** of an embodiment of the clipless bicycle cleat assembly **10** in accordance with the invention. The intermediate plate has a body **48** generally aligned with the body **22** of the second plate and defining a second pedal aperture **50** generally aligned with the first pedal aperture **24** of the second plate, the second pedal aperture **50** being sized and configured to receive the clipless bicycle pedal. The intermediate plate also includes a top surface **52**, a bottom surface **54**, and forward and rearward flanges **56**, **58**. The forward and rearward flanges of the intermediate plate generally align with the forward and rearward flanges **26**, **28** of the second plate respectively when the cleat assembly is assembled. The forward and rearward flanges of the intermediate plate each defines two bores **60** sized and configured to receive the spacers **34**, **36** on

the second plate's forward flange **26** and rearward flange **28** respectively when the cleat assembly is assembled. The top surface **30** of the forward and rearward flanges of the second plate abuts the bottom surface of the forward and rearward flanges of intermediate plate respectively when the cleat assembly is assembled. Having an intermediate layer that extends to at least encompass the spacers on the second plate's flanges serves to increase the stiffness of the cleat assembly and, as previously discussed, the spacers prevent deformation of the intermediate plate when the attachment screws are tightened. Additionally, at least a portion of the intermediate plate's body is thicker than the forward and rearward flanges. Decreasing the thickness of the intermediate plate in the region of the spacers serves to further reduce deformation of the intermediate layer due to applied clamp force when the attachment screws are tightened. This arrangement also results in a cleat assembly that is easier to walk in and that is more aerodynamic.

[0018] With reference now to FIG. 10, there is shown an embodiment of a clipless bicycle pedal **60** with which the cleat assembly can be used.

[0019] Although the invention has been described in detail with reference only to the presently preferred embodiments, those skilled in the art will appreciate that various modifications can be made without departing from the invention.

[0020] Preferred aspects of the invention can thus be summarized as follows:

[0021] A cleat assembly configured to be releasably secured to a clipless bicycle pedal, the cleat assembly comprising: a first plate; a second plate shaped to be disposed over the first plate, the second plate defining a first pedal aperture; and a plurality of spacers configured to be disposed between the first and second plates, the plurality of spacers each comprising a substantially non-deformable material and having a height to space apart the first and second plates at a predetermined distance when the plurality of spacers are disposed between the first and second plates.

[0022] The cleat assembly as described before, wherein the plurality of spacers are formed on either one or both of the first and second plates.

[0023] The cleat assembly as described before, wherein the plurality of spacers are formed on the second plate.

[0024] The cleat assembly as described before, wherein the plurality of spacers each comprises a base end, a terminal end, a side wall that tapers from the base end to the terminal end, and a bore through the base and terminal ends.

[0025] The cleat assembly as described before, wherein the second plate further comprises a first flange disposed around at least a portion of the pedal aperture, the first flange comprising at least one opening in communication with the bore of at least one of the plurality of spacers.

[0026] The cleat assembly as described before, further

comprising an intermediate plate disposed between the first and second plates.

[0027] The cleat assembly as described before, wherein the intermediate plate comprises: a body, and a second flange disposed around at least a portion of the body; wherein the body defines a second pedal aperture; and wherein the second flange comprises at least one bore sized and configured to allow at least one of the plurality of spacers to pass through.

[0028] The cleat assembly as described before, wherein at least a portion of the body of the intermediate plate is thicker than the second flange of the intermediate plate.

[0029] The cleat assembly as described before, further comprising a cap disposed over at least a portion of the second plate.

[0030] Alternatively, a cleat assembly configured to be releasably secured to a clipless bicycle pedal, the cleat assembly comprising: a first plate; and a second plate disposed over the first plate, the second plate defining a first pedal aperture having a circumferential periphery, the circumferential periphery comprising a first portion defining a first plane, and a side tie portion.

[0031] The cleat assembly as described before, wherein the side tie portion is offset from the first plane.

[0032] The cleat assembly as described before, wherein the first portion is in greater spaced relation to the first plate than the side tie portion.

[0033] The cleat assembly as described before, further comprising an intermediate plate disposed between the first and second plates, the intermediate plate having: a body, and a second flange disposed around at least a portion of the body, and wherein the thickness of at least a portion of the body of the intermediate plate is greater than the thickness of the second flange of the intermediate plate.

[0034] The cleat assembly as described before, further comprising: a plurality of spacers formed on the second plate and disposed between the first and second plates, the plurality of spacers each comprising a substantially non-deformable material and having a height to space apart the first and second plates at a predetermined distance; and wherein the plurality of spacers each comprises a base end, a terminal end, a side wall that tapers from the base end to the terminal end, and a bore through the base and terminal ends.

[0035] The cleat assembly as described before, wherein the second plate further comprises a first flange disposed around at least a portion of the first pedal aperture, the first flange comprising at least one opening in communication with the bore of at least one of the spacers to receive at least one screw for securing the second plate and the first plate; and wherein the second flange of the intermediate plate comprises at least one bore sized and configured to allow at least one of the spacers to pass through.

[0036] The cleat assembly as described before, further comprising a cap disposed over at least a portion of the

second plate.

[0037] Alternatively, a cleat assembly configured to be releasably secured to a clipless bicycle pedal, the cleat assembly comprising: a first plate; and a second plate disposed over the first plate, the second plate defining a first pedal aperture and comprising a peripheral edge having a first of an engagement pair; a cap comprising an external surface and an internal cavity, the cap configured to house the second plate within the internal cavity, the cap comprising a second of the engagement pair; wherein the first and second of the engagement pair removably couples the cap and the second plate; and wherein the first of the engagement pair comprises one of a plurality of grooves or a plurality of tongues and the second of the engagement pair comprises the other of the plurality of grooves or the plurality of tongues.

[0038] The cleat assembly as described before, further comprising a plurality of spacers formed on the second plate and configured to be disposed between the first and second plates, the plurality of spacers comprising a substantially non-deformable material and each having a height to space apart the first and second plates at a predetermined distance; and comprising an intermediate plate configured to be disposed between the first and second plates, the intermediate plate having a body defining a second pedal aperture, and the intermediate plate having a second flange disposed around at least a portion of the second pedal aperture, the second flange comprising at least one bore sized and configured to allow at least one of the plurality of spacers to pass through, and wherein the thickness of at least a portion of the body of the intermediate plate is greater than the thickness of the second flange of the intermediate plate; wherein the second plate further comprises a first flange disposed around at least a portion of the first pedal aperture, the first flange comprising at least one opening in communication with the bore of the plurality of spacers to receive at least one screw for securing the second plate and the first plate; and wherein the plurality of spacers comprises a base end, a terminal end, a side wall that tapers from the base end to the terminal end, and a bore through the base and terminal ends.

[0039] The cleat assembly as described before, wherein the first pedal aperture of the second plate comprises a circumferential periphery comprising a first portion defining a first plane and a side tie portion, wherein the side tie portion is offset from the first plane and wherein the first portion is in greater spaced relation to the first plate than the side tie portion.

Claims

1. A cleat assembly (10) configured to be releasably secured to a clipless bicycle pedal (60), the cleat assembly comprising:

a first plate (12);

- a second plate (20) shaped to be disposed over the first plate (12), the second plate (20) defining a first pedal aperture (24);
 an intermediate plate (16) disposed between the first and second plates (12, 20); and
 a plurality of spacers (34) configured to be disposed between the first and second plates, the plurality of spacers (34) each comprising a substantially non-deformable material and having a height to space apart the first and second plates (12, 20) at a predetermined distance when the plurality of spacers (34) are disposed between the first and second plates (12, 20),
 wherein the intermediate plate (16) comprises a body (48) and a flange (58) disposed around at least a portion of the body (48), wherein the body (48) defines a second pedal aperture (50), **characterised in that** the flange (58) comprises at least one bore (60) sized and configured to allow at least one of the plurality of spacers (34) to pass through.
2. The cleat assembly of claim 1, wherein the plurality of spacers (34) are formed on either one or both of the first and second plates (12, 20).
 3. The cleat assembly of claim 2, wherein the plurality of spacers (34) are formed on the second plate (20).
 4. The cleat assembly of claim 3, wherein the plurality of spacers (34) each comprises a base end (45), a terminal end (46), a side wall (44) that tapers from the base end (45) to the terminal end (46), and a spacer bore (40) through the base and terminal ends (45, 46).
 5. The cleat assembly of claim 4, wherein the second plate (20) further comprises a further flange (26) disposed around at least a portion of the first pedal aperture (24), said further flange (26) comprising at least one opening in communication with the spacer bore (40) of at least one of the plurality of spacers (34).
 6. The cleat assembly of claim 1, wherein at least a portion of the body (48) of the intermediate plate (16) is thicker than the flange (58) of the intermediate plate (16).
 7. The cleat assembly of claim 1, further comprising a cap (22) disposed over at least a portion of the second plate (20).
 8. The cleat assembly of claim 1, the first pedal aperture (24) having a circumferential periphery, the circumferential periphery comprising a first portion defining a first plane, and a side tie portion (25).
 9. The cleat assembly of claim 8, wherein the side tie portion (25) is offset from the first plane.
 10. The cleat assembly of claim 9, wherein the first portion is in greater spaced relation to the first plate (12) than the side tie portion (25).
 11. The cleat assembly of claim 1, wherein the thickness of at least a portion of the body (48) of the intermediate plate (16) is greater than the thickness of the flange (58) of the intermediate plate (16).
 12. The cleat assembly of claim 1, wherein:
 the second plate (20) further comprises a further flange (26) disposed around at least a portion of the first pedal aperture (24),
 said further flange (26) comprising at least one opening in communication with a bore (40) of at least one of the spacers (34) to receive at least one screw for securing the second plate (20) and the first plate (12), and
 the flange (58) of the intermediate plate (16) comprises the at least one plate bore (60).
 13. The cleat assembly of claim 1, wherein
 the second plate (20) comprises a peripheral edge having a first of an engagement pair,
 the cleat assembly comprises a cap (22) comprising an external surface and an internal cavity,
 the cap (22) is configured to house the second plate (20) within the internal cavity, the cap (22) comprising a second of the engagement pair,
 the first and second of the engagement pair removably couples the cap (22) and the second plate (20),
 the first of the engagement pair comprises one of a plurality of grooves (38) or a plurality of tongues (42), and
 the second of the engagement pair comprises the other of the plurality of grooves or the plurality of tongues.
 14. The cleat assembly of claim 13, wherein
 the thickness of at least a portion of the body (48) of the intermediate plate (16) is greater than the thickness of the flange (58) of the intermediate plate (16),
 the second plate (20) further comprises a further flange (26) disposed around at least a portion of the first pedal aperture (24),
 said further flange (26) comprises at least one opening in communication with a bore (40) of the plurality of spacers (34) to receive the at least one screw for securing the second plate (20)

and the first plate (12), and the plurality of spacers (34) comprises a base end (45), a terminal end (46), a side wall (44) that tapers from the base end to the terminal end, the bore (40) extending through the base and terminal ends.

15. The cleat assembly of claim 14, wherein the first pedal aperture (24) of the second plate (20) comprises a circumferential periphery comprising a first portion defining a first plane and a side tie portion (25), wherein the side tie portion (25) is offset from the first plane, and wherein the first portion is in greater spaced relation to the first plate (12) than the side tie portion (25).

Patentansprüche

1. Pedalplattenanordnung (10), die dazu ausgebildet ist, lösbar an einem Fahrradklickpedal (60) befestigt zu werden, wobei die Pedalplattenanordnung aufweist:

eine erste Platte (12);
eine zweite Platte (20), die so geformt ist, dass sie über der ersten Platte (12) angeordnet werden kann, wobei die zweite Platte (20) eine erste Pedalöffnung (24) definiert;
eine Zwischenplatte (16), die zwischen der ersten und der zweiten Platte (12, 20) angeordnet ist; und
eine Vielzahl von Abstandshaltern (34), die dazu ausgebildet sind, dass sie zwischen der ersten und der zweiten Platte angeordnet werden können, wobei die Vielzahl von Abstandshaltern (34) jeweils ein im Wesentlichen nicht verformbares Material aufweist und eine Höhe besitzt, um die erste und die zweite Platte (12, 20) in einem vorbestimmten Abstand voneinander zu beabstanden, wenn die Vielzahl von Abstandshaltern (34) zwischen der ersten und der zweiten Platte (12, 20) angeordnet sind, wobei die Zwischenplatte (16) einen Körper (48) und einen Flansch (58) aufweist, der um mindestens einen Teil des Körpers (48) herum angeordnet ist, wobei der Körper (48) eine zweite Pedalöffnung (50) definiert, **dadurch gekennzeichnet, dass** der Flansch (58) mindestens eine Bohrung (60) aufweist, die so bemessen und ausgebildet ist, dass mindestens einer der Vielzahl von Abstandshaltern (34) hindurchtreten kann.

2. Pedalplattenanordnung nach Anspruch 1, wobei die Vielzahl von Abstandshaltern (34) entweder an einer oder an beiden der ersten und zweiten Platten (12, 20) ausgebildet sind.

3. Pedalplattenanordnung nach Anspruch 2, wobei die Vielzahl von Abstandshaltern (34) an der zweiten Platte (20) ausgebildet sind.

4. Pedalplattenanordnung nach Anspruch 3, wobei die Vielzahl von Abstandshaltern (34) jeweils ein Basisende (45), ein Abschlussende (46), eine Seitenwand (44), die sich von dem Basisende (45) zu dem Abschlussende (46) verjüngt, und eine Abstandshalterbohrung (40) durch das Basis- und das Abschlussende (45, 46) aufweisen.

5. Pedalplattenanordnung nach Anspruch 4, wobei die zweite Platte (20) ferner einen weiteren Flansch (26) aufweist, der um mindestens einen Teil der ersten Pedalöffnung (24) herum angeordnet ist, wobei der weitere Flansch (26) mindestens eine Öffnung aufweist, die mit der Abstandshalterbohrung (40) von mindestens einem der Vielzahl von Abstandshaltern (34) in Verbindung steht.

6. Pedalplattenanordnung nach Anspruch 1, wobei mindestens ein Teil des Körpers (48) der Zwischenplatte (16) dicker ist als der Flansch (58) der Zwischenplatte (16).

7. Pedalplattenanordnung nach Anspruch 1, ferner mit einer Kappe (22), die über mindestens einem Teil der zweiten Platte (20) angeordnet ist.

8. Pedalplattenanordnung nach Anspruch 1, wobei die erste Pedalöffnung (24) einen umlaufenden Rand besitzt, wobei der umlaufende Rand einen ersten Teil, der eine erste Ebene definiert, und einen seitlichen Verbindungsabschnitt (25) aufweist.

9. Pedalplattenanordnung nach Anspruch 8, wobei der seitliche Verbindungsabschnitt (25) gegenüber der ersten Ebene versetzt ist.

10. Pedalplattenanordnung nach Anspruch 9, wobei der erste Teil in einem größeren Abstand zu der ersten Platte (12) angeordnet ist als der seitliche Verbindungsabschnitt (25).

11. Pedalplattenanordnung nach Anspruch 1, wobei die Dicke von mindestens einem Teil des Körpers (48) der Zwischenplatte (16) größer ist als die Dicke des Flansches (58) der Zwischenplatte (16).

12. Pedalplattenanordnung nach Anspruch 1, wobei:

die zweite Platte (20) ferner einen weiteren Flansch (26) aufweist, der um mindestens einen Teil der ersten Pedalöffnung (24) angeordnet ist, der weitere Flansch (26) mindestens eine Öffnung aufweist, die mit einer Bohrung (40) min-

destens eines der Abstandshalter (34) in Verbindung steht, um mindestens eine Schraube zur Befestigung der zweiten Platte (20) und der ersten Platte (12) aufzunehmen, und
 5 der Flansch (58) der Zwischenplatte (16) die mindestens eine Plattenbohrung (60) aufweist.

13. Pedalplattenanordnung nach Anspruch 1, wobei

10 die zweite Platte (20) eine Umfangskante aufweist, die einen ersten Teil eines Eingriffspaares besitzt,
 die Pedalplattenanordnung eine Kappe (22) aufweist, die eine Außenfläche und einen inneren Hohlraum aufweist,
 15 die Kappe (22) dazu ausgebildet ist, dass sie die zweite Platte (20) innerhalb des inneren Hohlraums aufnimmt,
 die Kappe (22) einen zweiten Teil des Eingriffspaares aufweist,
 20 der erste Teil und der zweite Teil des Eingriffspaares die Kappe (22) und die zweite Platte (20) lösbar koppelt,
 der erste Teil des Eingriffspaares eines aus einer Vielzahl von Nuten (38) oder einer Vielzahl von Zungen (42) aufweist, und
 25 der zweite Teil des Eingriffspaares das andere aus der Vielzahl von Nuten oder der Vielzahl von Zungen aufweist.

14. Pedalplattenanordnung nach Anspruch 13, wobei

30 die Dicke von mindestens einem Teil des Körpers (48) der Zwischenplatte (16) größer ist als die Dicke des Flansches (58) der Zwischenplatte (16),
 35 die zweite Platte (20) ferner einen weiteren Flansch (26) umfasst, der um mindestens einen Teil der ersten Pedalöffnung (24) angeordnet ist,
 40 der weitere Flansch (26) mindestens eine Öffnung aufweist, die mit einer Bohrung (40) der Vielzahl von Abstandshaltern (34) in Verbindung steht, um die mindestens eine Schraube zur Befestigung der zweiten Platte (20) und der ersten Platte (12) aufzunehmen, und
 45 die Vielzahl von Abstandshaltern (34) ein Basisende (45), ein Abschlussende (46) und eine Seitenwand (44) aufweist, die sich vom Basisende zum Abschlussende hin verjüngt, wobei
 50 sich die Bohrung (40) durch das Basisende und das Abschlussende erstreckt.

15. Pedalplattenanordnung nach Anspruch 14, wobei

55 die erste Pedalöffnung (24) der zweiten Platte (20) einen umlaufenden Rand aufweist, die einen ersten Teil, der eine erste Ebene definiert, und einen seitliche Verbindungsabschnitt (25) aufweist, wobei der

seitliche Verbindungsabschnitt (25) gegenüber der ersten Ebene versetzt ist, und wobei der erste Teil in einem größeren Abstand zu der ersten Platte (12) liegt als der seitliche Verbindungsabschnitt (25).

Revendications

1. Ensemble cale (10) conçu pour être fixé de manière libérable à une pédale de vélo automatique (60), l'ensemble cale comprenant :

une première plaque (12) ;
 une seconde plaque (20) façonnée pour être disposée au-dessus de la première plaque (12), la seconde plaque (20) définissant une première ouverture de pédale (24) ;
 une plaque intermédiaire (16) disposée entre les première et seconde plaques (12, 20) ; et
 une pluralité de butées d'espacement (34) conçues pour être disposées entre les première et seconde plaques, la pluralité de butées d'espacement (34) comprenant chacune un matériau essentiellement non déformable et présentant une hauteur prévue pour écarter l'une de l'autre les première et seconde plaques (12, 20) d'une distance prédéterminée lorsque la pluralité de butées d'espacement (34) sont disposées entre les première et seconde plaques (12, 20),
 la plaque intermédiaire (16) comprenant un corps (48) et une ailette (58) disposée autour d'au moins une partie du corps (48), le corps (48) définissant une seconde ouverture de pédale (50), **caractérisé en ce que** l'ailette (58) comprend au moins une lumière (60) dimensionnée et conçue pour permettre à au moins une butée d'espacement de la pluralité de butées d'espacement (34) de passer à travers.

2. Ensemble cale selon la revendication 1, dans lequel la pluralité de butées d'espacement (34) sont formées sur l'une ou l'autre des première et seconde plaques (12, 20) ou les deux.

3. Ensemble cale selon la revendication 2, dans lequel la pluralité de butées d'espacement (34) sont formées sur la seconde plaque (20).

4. Ensemble cale selon la revendication 3, dans lequel la pluralité de butées d'espacement (34) comprennent chacune une extrémité de base (45), une extrémité terminale (46), une paroi latérale (44) qui s'étend de l'extrémité de base (45) à l'extrémité terminale (46), et une lumière de butée d'espacement (40) s'étendant à travers les extrémités de base et terminale (45, 46).

5. Ensemble cale selon la revendication 4, dans lequel

- la seconde plaque (20) comprend en outre une autre ailette (26) disposée autour d'au moins une partie de la première ouverture de pédale (24), ladite autre ailette (26) comprenant au moins un orifice communiquant avec la lumière de butée d'espacement (40) d'au moins une butée d'espacement de la pluralité de butées d'espacement (34). 5
6. Ensemble cale selon la revendication 1, dans lequel au moins une partie du corps (48) de la plaque intermédiaire (16) est plus épaisse que l'ailette (58) de la plaque intermédiaire (16). 10
7. Ensemble cale selon la revendication 1, comprenant en outre une coiffe (22) disposée au-dessus d'au moins une partie de la seconde plaque (20). 15
8. Ensemble cale selon la revendication 1, la première ouverture de pédale (24) ayant une périphérie circonférentielle, la périphérie circonférentielle comprenant une première partie définissant un premier plan, et une partie formant raccord latéral (25). 20
9. Ensemble cale selon la revendication 8, dans lequel la partie formant raccord latéral (25) est décalée vis-à-vis du premier plan. 25
10. Ensemble cale selon la revendication 9, dans lequel la première partie est davantage espacée de la première plaque (12) que la partie formant raccord latéral (25). 30
11. Ensemble cale selon la revendication 1, dans lequel l'épaisseur d'au moins une partie du corps (48) de la plaque intermédiaire (16) est supérieure à l'épaisseur de l'ailette (58) de la plaque intermédiaire (16). 35
12. Ensemble cale selon la revendication 1, dans lequel : 40
- la seconde plaque (20) comprend en outre une autre ailette (26) disposée autour d'au moins une partie de la première ouverture de pédale (24), 45
- ladite autre ailette (26) comprenant au moins un orifice communiquant avec une lumière (40) d'au moins une des butées d'espacement (34) pour recevoir au moins une vis à des fins de fixation de la seconde plaque (20) et la première plaque (12), et 50
- l'ailette (58) de la plaque intermédiaire (16) comprend l'au moins une lumière de plaque (60).
13. Ensemble cale selon la revendication 1, dans lequel 55
- la seconde plaque (20) comprend un bord périphérique comportant un premier élément d'une paire d'éléments d'accouplement,
- l'ensemble cale comprend une coiffe (22) comprenant une surface extérieure et une cavité intérieure, 60
- la coiffe (22) est conçue pour loger la seconde plaque (20) dans la cavité intérieure, 65
- la coiffe (22) comprenant un second élément de la paire d'éléments d'accouplement, 70
- les premier et second éléments de la paire d'éléments d'accouplement accouplent de manière amovible la coiffe (22) et la seconde plaque (20), 75
- le premier élément de la paire d'éléments d'accouplement comprend l'une ou l'autre d'une pluralité de rainures (38) et une pluralité de languettes (42), et 80
- le second élément de la paire d'éléments d'accouplement comprend l'autre de la pluralité de rainures et la pluralité de languettes.
14. Ensemble cale selon la revendication 13, dans lequel 85
- l'épaisseur d'au moins une partie du corps (48) de la plaque intermédiaire (16) est supérieure à l'épaisseur de l'ailette (58) de la plaque intermédiaire (16), 90
- la seconde plaque (20) comprend en outre une autre ailette (26) disposée autour d'au moins une partie de la première ouverture de pédale (24), 95
- ladite autre ailette (26) comprend au moins un orifice communiquant avec une lumière (40) de la pluralité de butées d'espacement (34) pour recevoir l'au moins une vis à des fins de fixation de la seconde plaque (20) et la première plaque (12), et 100
- la pluralité de butées d'espacement (34) comprennent une extrémité de base (45), une extrémité terminale (46), une paroi latérale (44) qui s'effile de l'extrémité de base à l'extrémité terminale, la lumière (40) s'étendant à travers les extrémités de base et terminale. 105
15. Ensemble cale selon la revendication 14, dans lequel la première ouverture de pédale (24) de la seconde plaque (20) comprend une périphérie circonférentielle comprenant une première partie définissant un premier plan et une partie formant raccord latéral (25), dans lequel la partie formant raccord latéral (25) est décalée vis-à-vis du premier plan, et dans lequel la première partie est davantage espacée de la première plaque (12) que la partie formant raccord latéral (25). 110

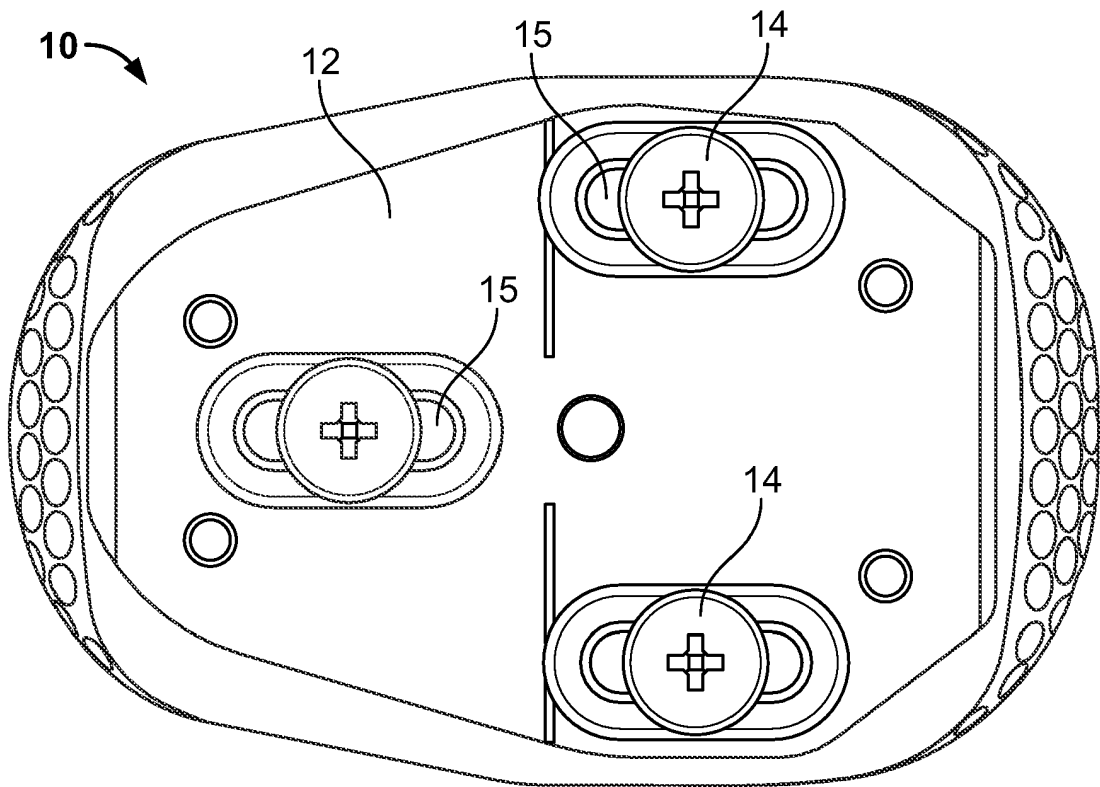


FIG. 1

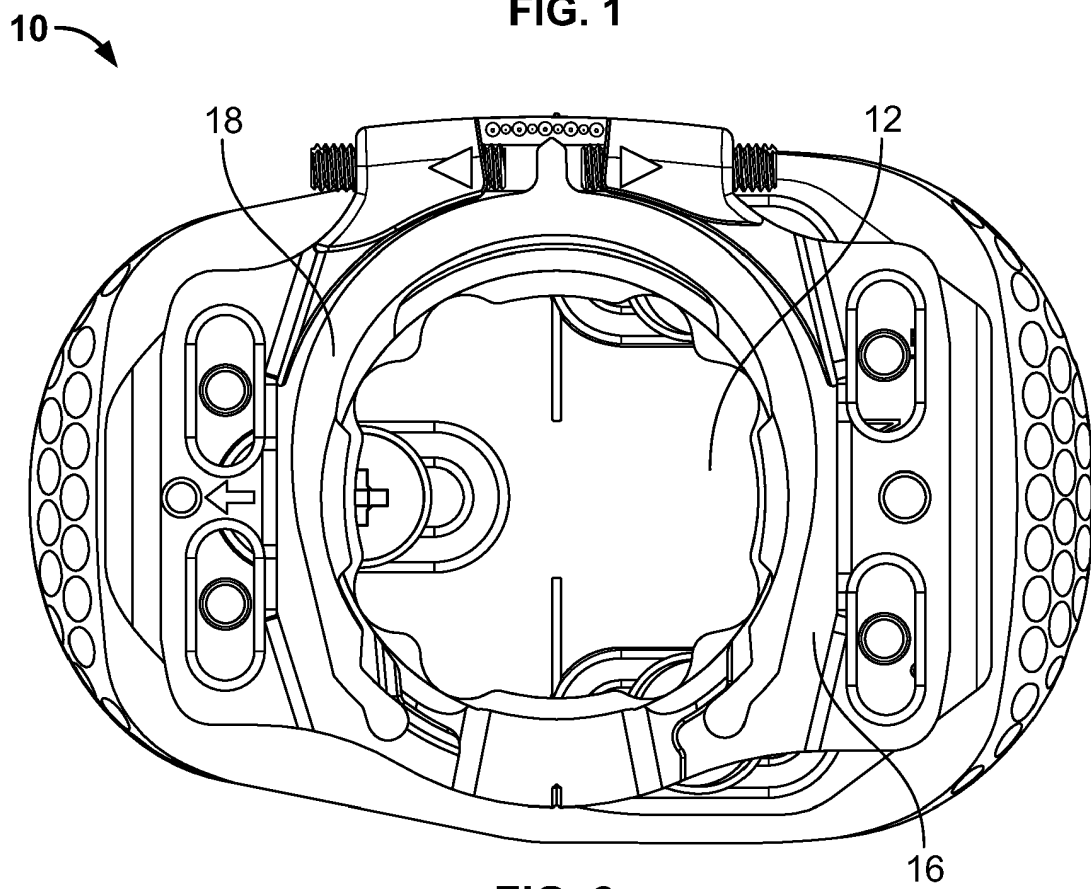


FIG. 2

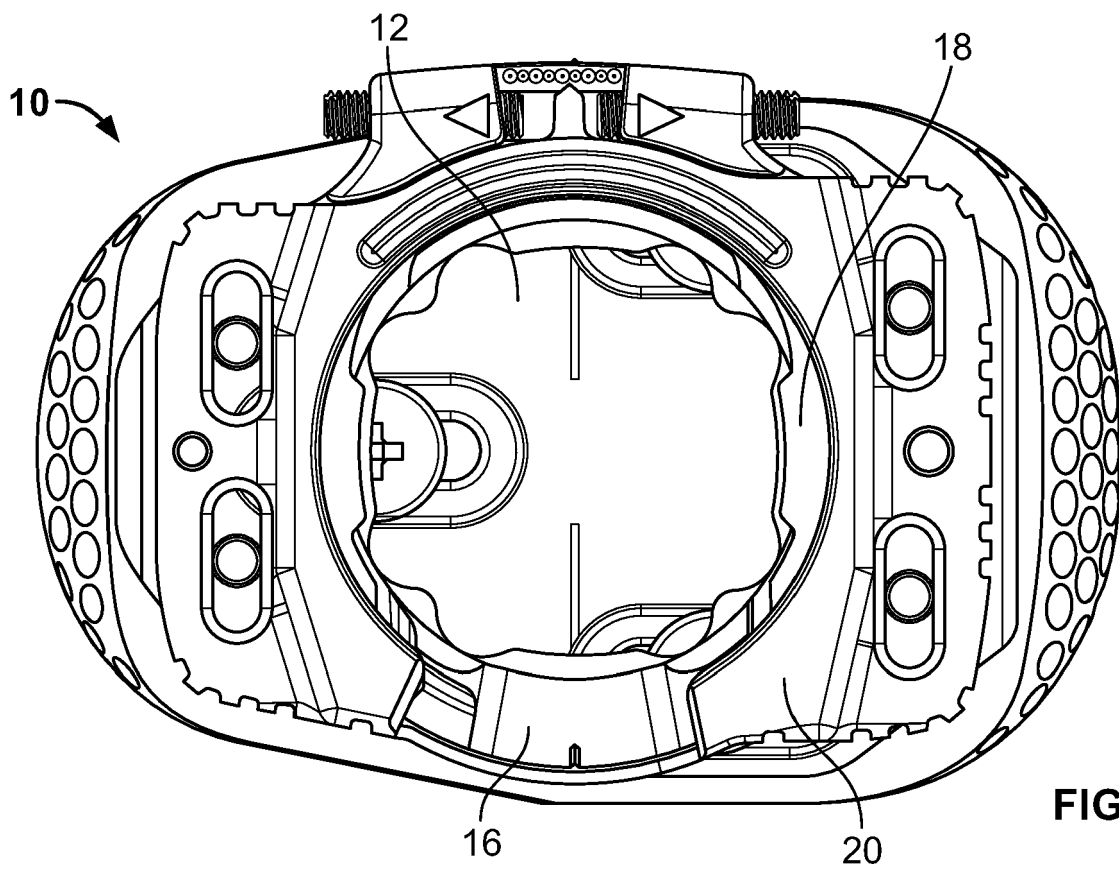


FIG. 3

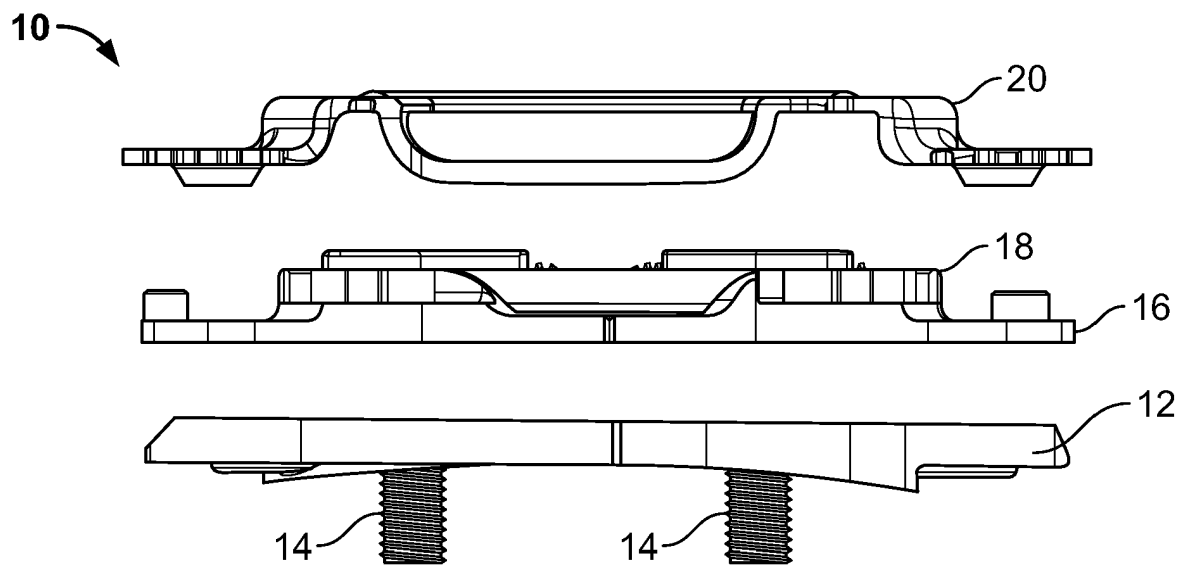


FIG. 4A

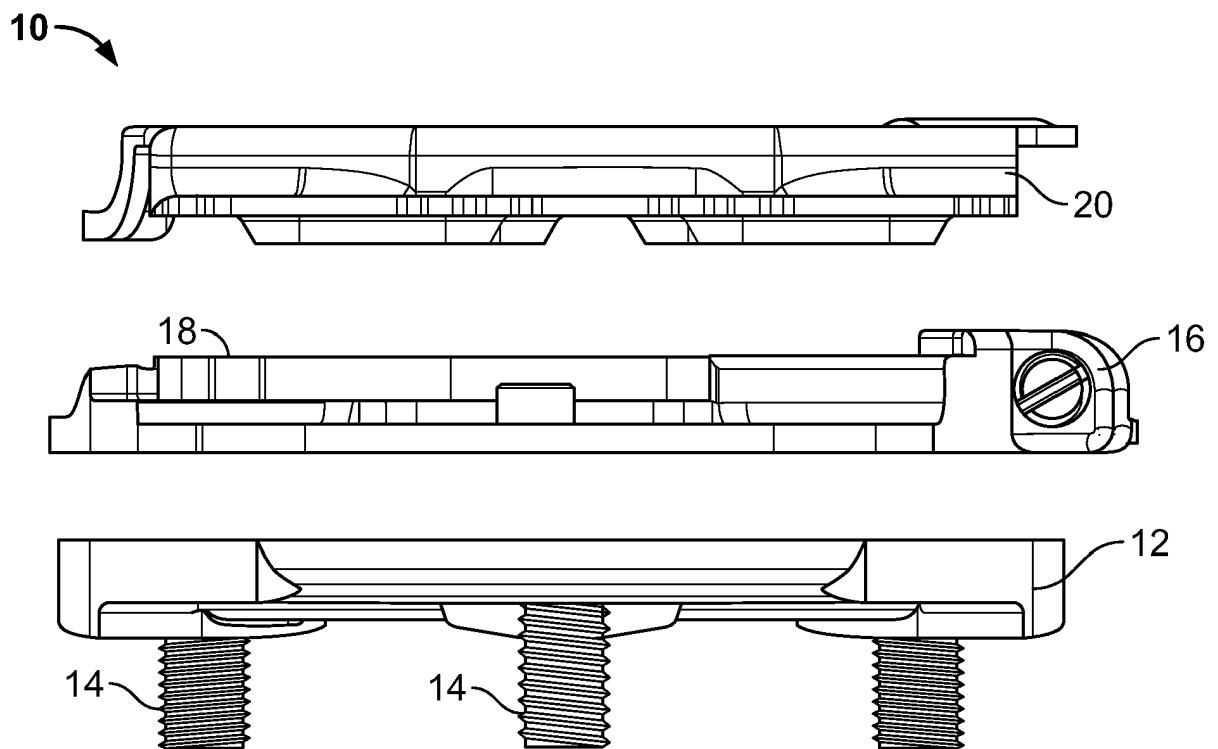


FIG. 4B

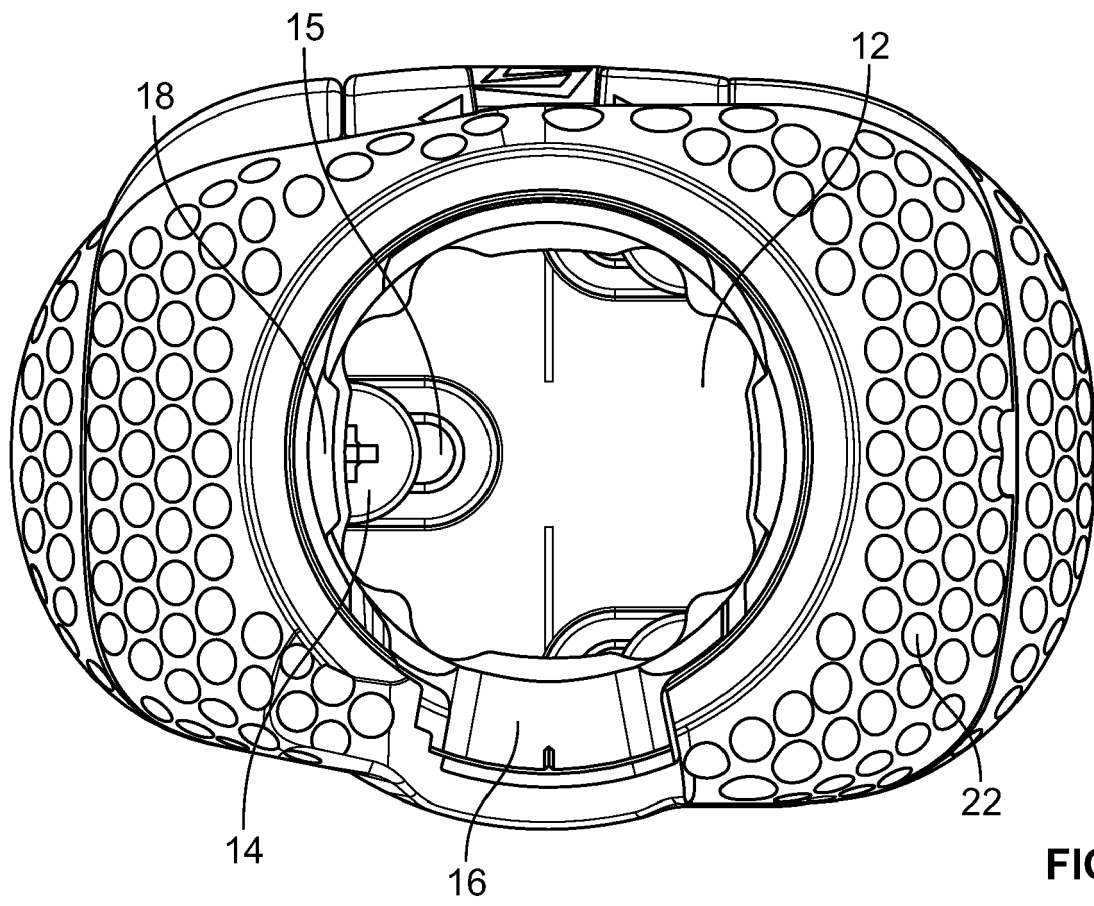
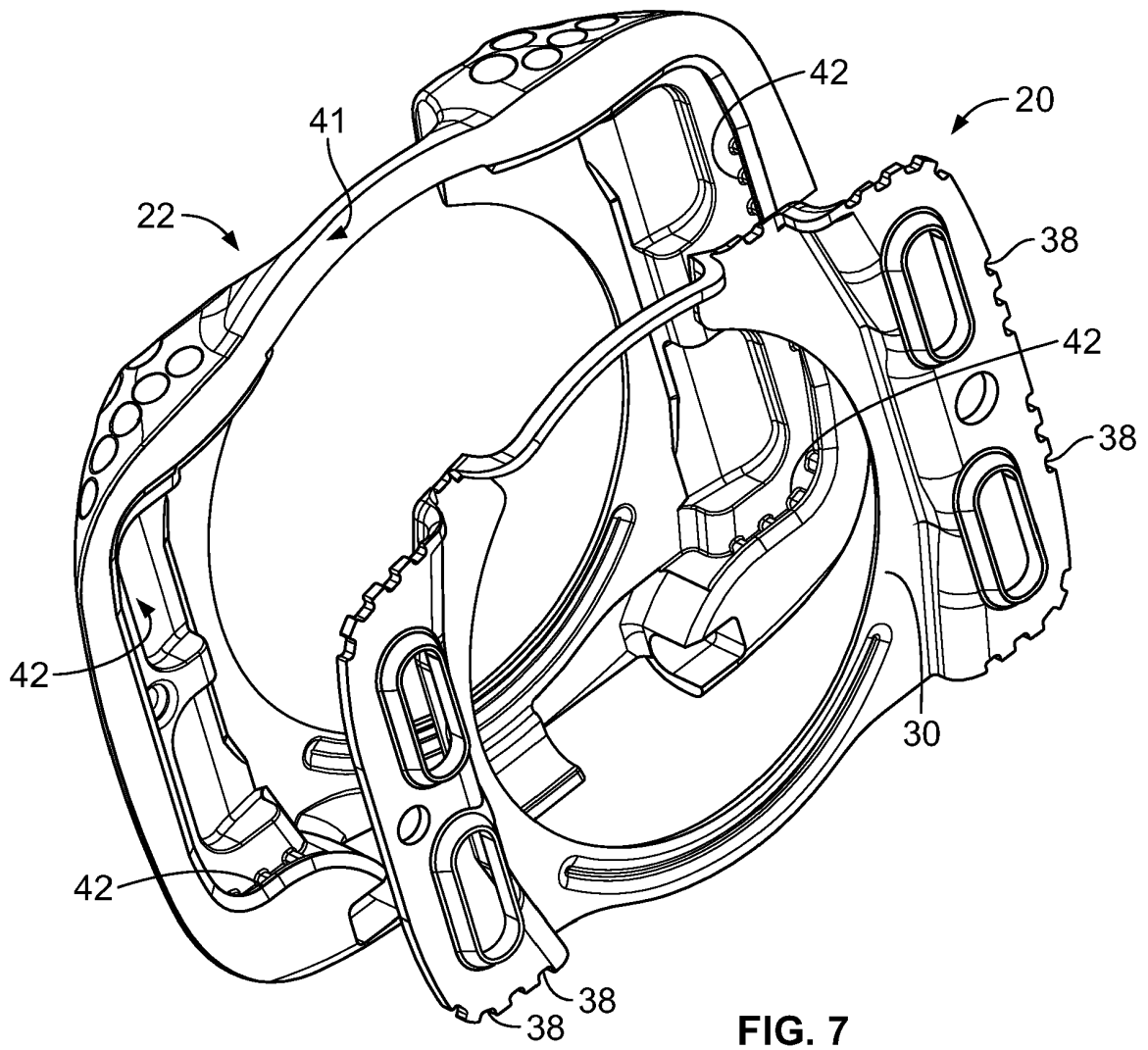
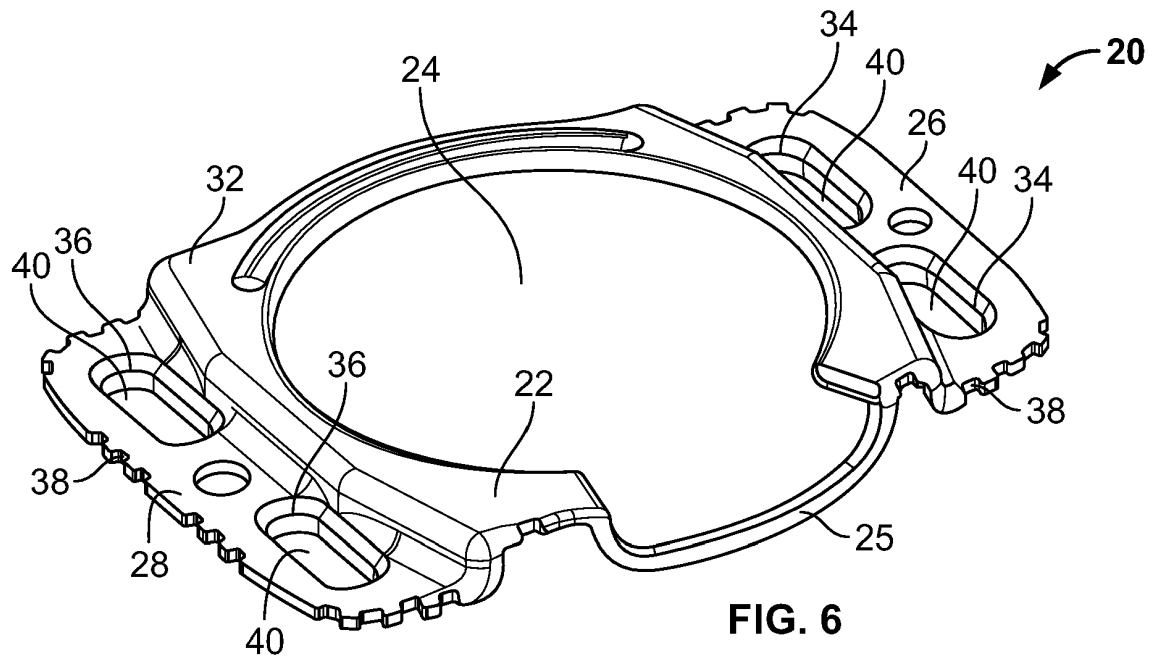
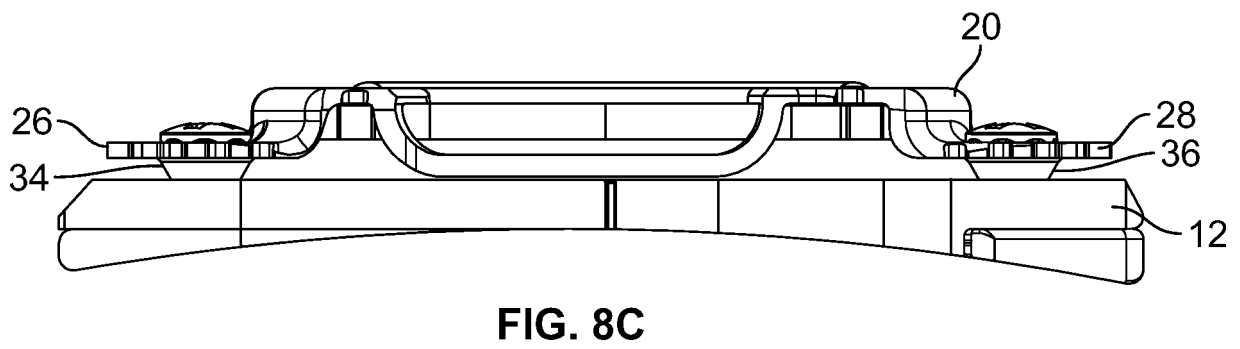
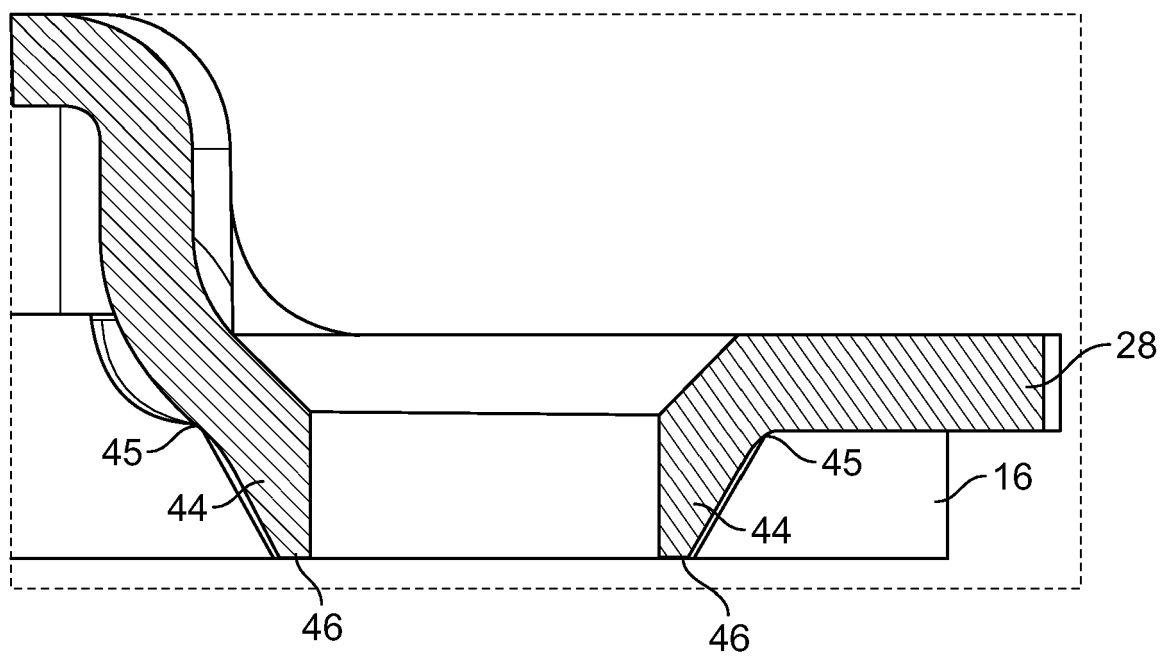
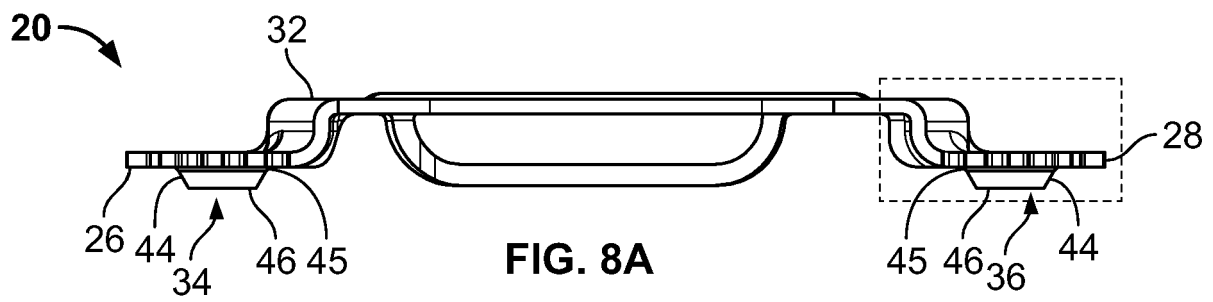


FIG. 5





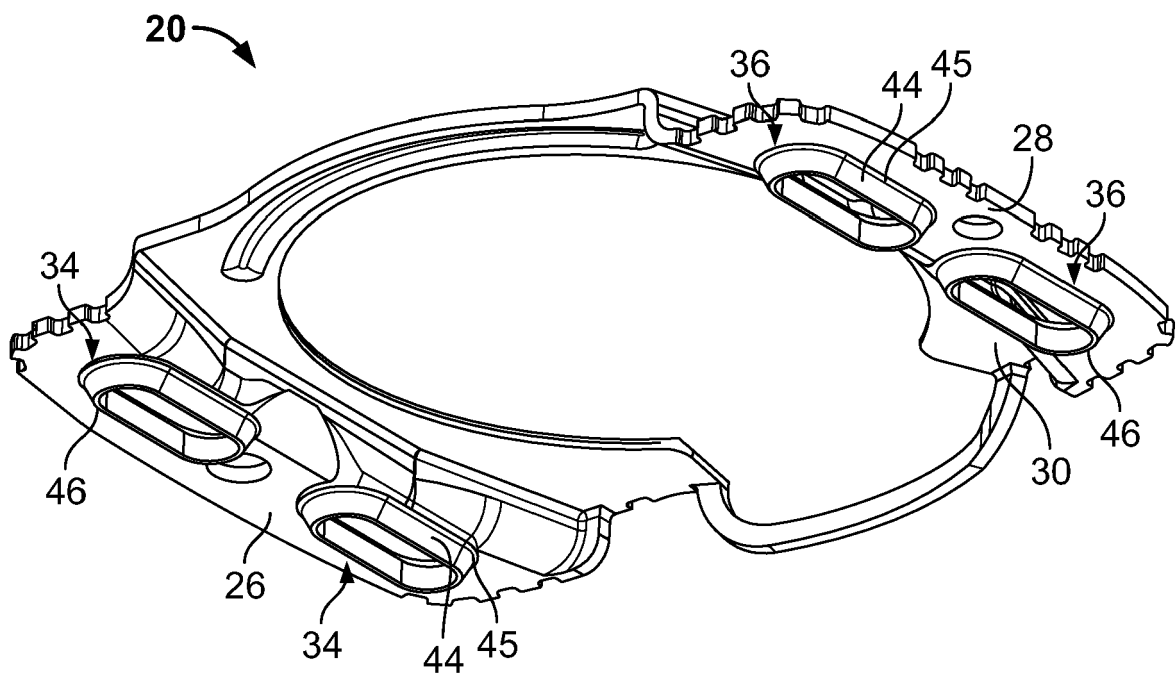


FIG. 8D

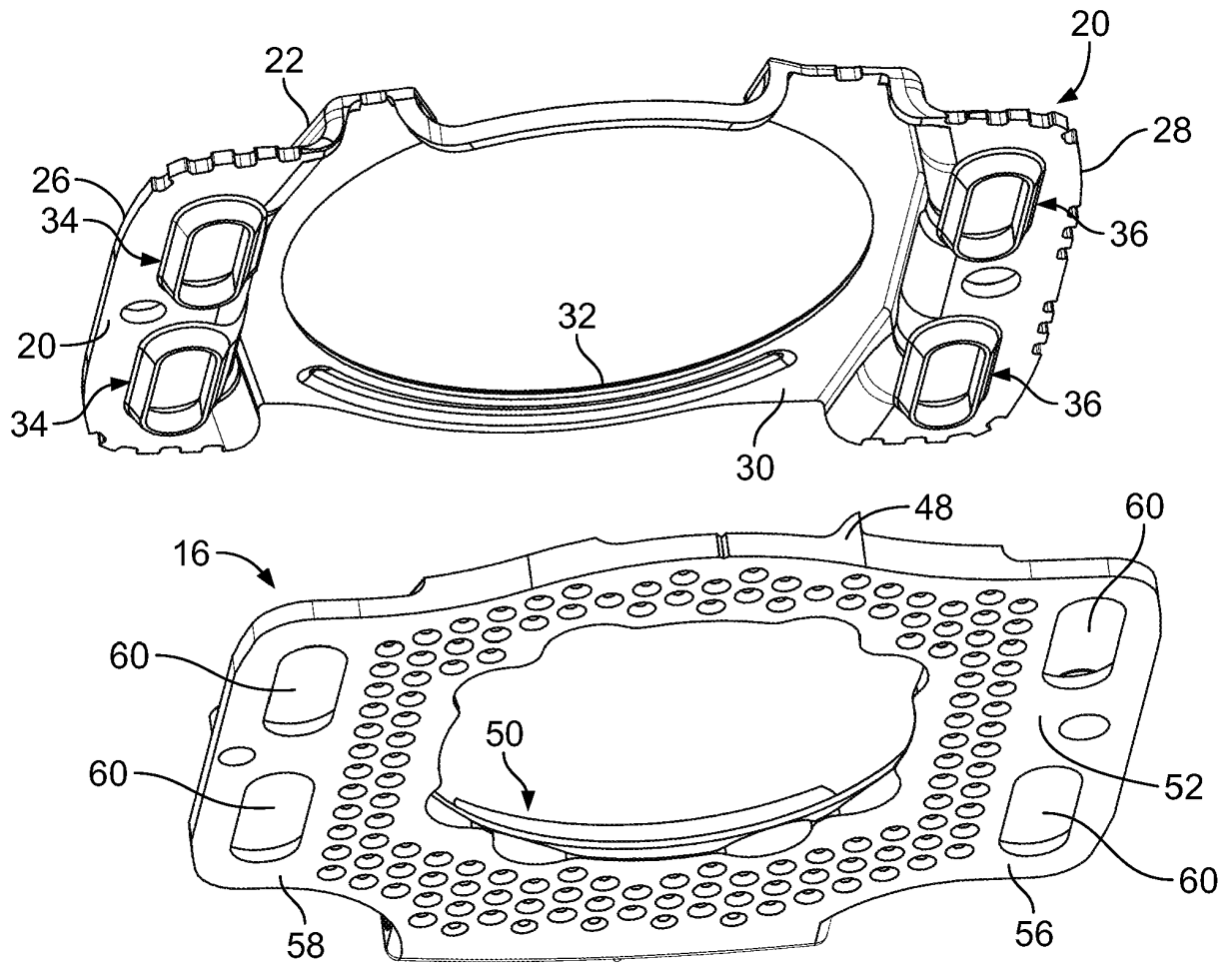


FIG. 9

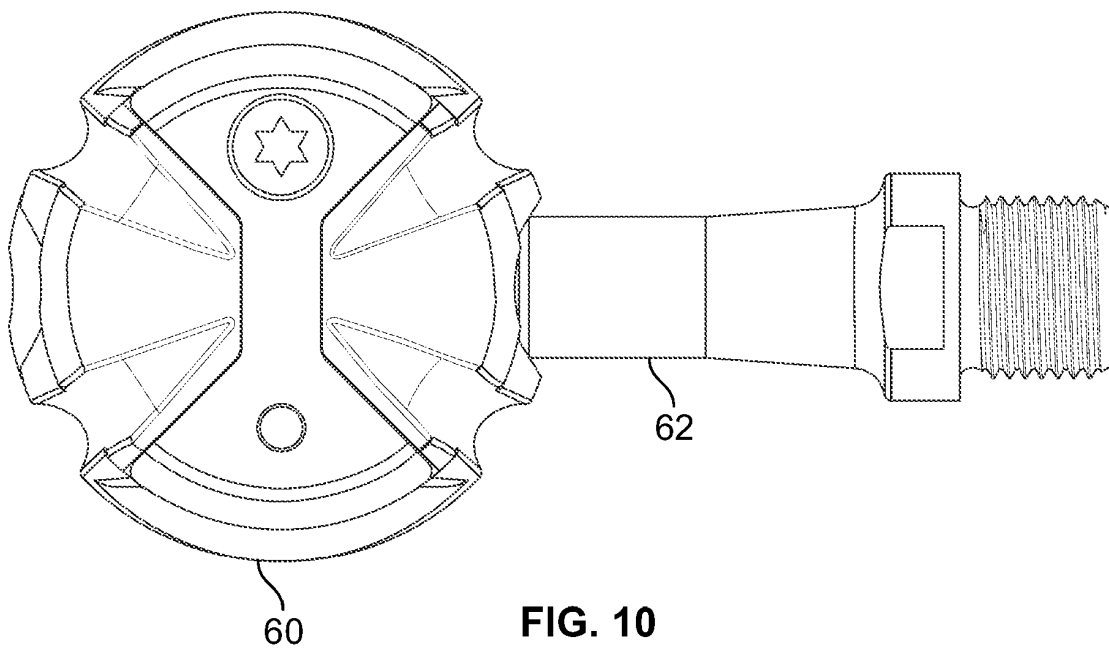


FIG. 10

REFERENCES CITED IN THE DESCRIPTION

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